# The Mining Journal.

No. 442.] ENLARGED SHEET. [Feb. 10.

THE CORNWALL RAILWAY. 42

## AT A PUBLIC MEETING of the SHAREHOLDERS and OTHERS INTERESTED IN THE CONSTRUCTION OF A RAILWAY THROUGH CORNWALL,

convened "for the purpose of receiving a REPORT of the provisional committee, and devising such plans as may be deemed needful for the carrying out this important measure,"

The Right Hon. the EARL of FALMOUTH in the chair.

Mr. Bond, the honorary secretary, read the following

### REPORT OF THE PROVISIONAL COMMITTEE:

The question of a railway through Cornwall is not a new subject, presented for the first time to the attention of the county, but was first laid before it in 1836, and was again revived in October, 1839, when a county meeting was held at Bodmin, at which the Sheriff presided; a committee, consisting of the noblemen and gentlemen resident in the county, was then appointed, to consider the subject in all its bearings—viz.: "The best lines of railway communication from Exeter to Falmouth, and all available means of raising such a fund as would hold out a reasonable hope of carrying it into effect." On the 2nd of October, 1840, this committee reported, at a second county meeting, that the traffic, which had been carefully taken, and subjected to the scrutiny and revision of competent persons, was such as to justify the expense of another survey; this was accordingly effected by Capt. W. S. Moorsom; and on the 7th of January, 1841, a report was made at another county meeting of the result of his labours. At the close of that report the committee stated—"It only remained for them to point out the methods by which the accomplishment of an object so important to it might be promoted by landholders, merchants, and others, interested in its prosperity:—First, by taking shares; second, by exchanging land for shares; third, by agreeing to part with land on such fair and equitable terms as might evince a desire to support the undertaking; further, that promptitude, energy, and perseverance, ought to be the watchwords of the county in its endeavour to secure and confirm the immense nautical advantages resulting from its south westerly position. The question (they said) is not a local one, but one in which every individual westward of Exeter is more or less interested, and therefore one to which our united energies should be applied—and, if so applied, there can be no doubt of success." The state of the money market, with other circumstances which tended to depress the railway interest, precluded any attempt to carry into effect the project thus earnestly recommended; and, from the prospect of any immediate result being thus blighted, the funds required to liquidate the expense of the survey could not be obtained in this county—while in Devonshire scarcely any notice was taken of this movement.

In May last, information was most unexpectedly obtained that the Government was making arrangements for the removal of the steam-packet establishment from Falmouth to Southampton—and in June, a deputation, accompanied by the Members of Parliament for the county and others, had an audience of Sir Robert Peel, when it was clearly ascertained that the only ground of reason for this measure was the supposed advantage of the South Western Railway communication with Southampton. In the course of the inquiries and efforts of the deputation, it was reiterated in every place—at Liverpool, Bristol, Birmingham, and London—Why do you not endeavour to procure the construction of a railway?—then, no port could vie with Falmouth in its maritime advantages. It was also known at this time that the Great Western had influenced other railway companies to afford assistance of the most efficient kind to Plymouth, to enable its inhabitants to construct a railway through South Devon to that town. Feeling this to be a most important measure to the interests of Cornwall, a meeting of a few individuals was held at Truro, on the 7th of July, to consider how far the question of a Cornwall Railway could be revived—and it was resolved that another effort should be made towards the object; Lady Basset and Lord Wodehouse having expressed their readiness to afford their aid, about £[illegible] was forthwith subscribed—and a further meeting at Redruth followed, at which Mr. Pendarves presided, and the subscriptions, including the chairman's of £1000, increased to about £[illegible]. At this meeting a provisional committee was formed, and Messrs. W. M. Tweedy and Bond were requested to proceed to the meeting of the Great Western Company, about to be held at Bristol, for the purpose of ascertaining what that company would do to aid Cornwall in the extension of a line through it. On the 14th of August, these gentlemen reported to the provisional committee that they had been received most favourably by the chairman, secretary, and engineer, at Bristol, and by the board of directors in London. From these gentlemen they ascertained that the views of the directors of the Great Western Railway were so decided on the superior advantages of a southern line through Devonshire, that they had determined on giving it efficient support, amounting to one third of the capital required—and that as soon as the Cornwall gentlemen had placed themselves in a position to seek their aid, they would be found ready to give their best consideration to any project for a further extension which might be laid before them, and that it might be taken for granted that their ultimate object was to get to Falmouth. It was then resolved, that Mr. Bond should be requested to seek additional subscriptions, furnish information, and form local committees throughout the county.

These points have been to some extent carried out. Mr. Bond has held preliminary meetings at Liskeard, Truro, Falmouth, Redruth, Camborne, and Penzance, in which places subscriptions have been obtained, resolutions passed approving the course adopted by the provisional committee, and local committees formed to co-operate in the measure. He has likewise corresponded with nearly all the leading landed proprietors in the county, from a large proportion of whom he has received assurances of support—either authorising the insertion of their names in the subscription list, promising lands on liberal terms, or eventually giving their aid when the undertaking shall have assumed a more definite form. The subscriptions in the county at present amount to nearly £[illegible]—a larger sum, it is believed, than has ever been raised in any locality in England, except Lancashire and the metropolis, for such a purpose, thereby showing the interest which is generally taken in its success. Hitherto no steps have been taken by the committee in reference to the course of the line through the county, although the committee are aware that this is a question which in a variety of ways is of great importance. It has been already stated, that the Great Western, and other companies connected with it, are decidedly favourable to the southern line—and having given their support to the South Devon line, it is obvious, that not only would no support be expected from them to a separate, and in some respects a competing, line, but that they would [illegible] every obstacle to any project for a northern line. It must, therefore, be one of the first duties of the provisional committee which may be appointed to manage the affairs of the company (which it is hoped will this day be formed) to ascertain how far the interests of this county can be secured by a union with the South Devon line at Plymouth—and any difficulties which may arise from the passage across Hamoaze, and the extension from the water's edge to the station at [illegible], be obviated. [illegible] a due protection for our interests can be obtained, it appears to the committee that many advantages may be realised by the adoption of the southern line, and that the traffic would yield a larger return on the capital than on a northern line. The question of an extension to Penzance has occupied the anxious attention of the committee; and the success which has attended the working of the Hayle line, as a locomotive passenger line, leads to a conviction that such an extension would yield an ample return for the capital required; it will, however, demand serious consideration whether it will be possible to raise the additional capital that would be needed in the first instance.

The mode of raising the required capital is a subject to which the committee have given great attention—and they have to report upon it, that, having already raised nearly £[illegible] in the county, they hope, from the naturally enterprising and persevering spirit which characterises its inhabitants, to increase that sum to £[illegible]. In October last, an offer of capital to the extent of £[illegible] was made to the committee, which, from the very limited period allowed for taking the needful Parliamentary steps, and from there not being any time to consult the body of shareholders, they did not consider it justifiable to accept. The abundance of unemployed money has recently given an extraordinary impetus to railway investments, and induced a very general disposition to seek them; the safety and regularity in the payment of interest and dividend, and the greatly increasing traffic on all the principal lines, have induced numbers to regard railway shares and railway bonds with favour, who a few years since would not meddle with them—and the value of all such securities has greatly increased; and, within the last twenty-four hours, your committee have received such information as enables them to assure the meeting that in London a very strong disposition exists to give active and efficient support to a Cornish Railway, so soon as the plans of its supporters in this county have assumed a definite form. The secretary of the Great Western Railway Company has also officially informed the committee that the cordial support of the western companies shall be given to the Cornwall south line, whenever it is brought forward—in fact, he says, "It forms the basis of our combination with other companies, as I have already, I think, assured you." The committee, moreover, feel warranted in stating, that a plan is now under the consideration of Government, by which it may be enabled to render efficient aid to the Cornwall and other railways similarly circumstanced.

The committee have not hitherto been able to obtain such complete information of the atmospheric principle as applied to railways as to feel at present justified in confidently recommending this mode of construction, but they have had a variety of communications on the subject. The patentees state, that the atmospheric railway can be constructed at a less cost, and worked at one third the expense of a locomotive line, whilst the speed of fifty miles per hour can be obtained over gradients of one in forty, with thirty-five tons of passengers or other traffic. These statements, taken in connection with the reduced period of time required in construction, and the safety with which it can be traversed, present the greatest encouragement to its adoption; and, should the expectations held out be realised, it will afford advantages to shareholders of the most profitable nature—expectations which are greatly confirmed by the information contained in the prospectus of the [illegible] Railway, just published. In this the directors say, "Having made a satisfactory inquiry as to the decided economy with which the Dublin and Kingstown Extension Railway is now being worked as an atmospheric line, and their engineer (Mr. Brunel) having satisfied himself as to the advantages this plan of [illegible], recommends its adoption on the proposed line of communication, both as a means of keeping the capital within a very moderate amount, and increasing the profits by a reduced charge of working." [illegible]

The committee, believing that an impression now prevails very generally in the county that an effort must be made to obtain a railway, consider that the time has arrived when it becomes their duty to invite you to proceed at once to the formation of a company to carry out this design. The price of iron and other materials, the abundance of capital, the danger to the interests of the county by further delay, all press the subject upon the attention of every Cornishman. The committee, therefore, earnestly recommend the immediate formation of a company, the appointment of a provisional committee, the nomination of an engineer and other officers; and also that the requisite means may be taken to ascertain the views and feelings of the landed proprietors along the line—to open a communication with the Great Western and other companies, before the South Devon bill is brought under the consideration of Parliament—to ascertain the views of the Government, and the terms on which its aid can be obtained—to apply to capitalists, and secure their assistance—and to proceed to make the necessary surveys, so as fully to prepare for going to Parliament in the session of 1845.

Should the company be formed, the committee recommend that the shares should be of the value of £[illegible] each, that £1 per share be paid immediately to meet the preliminary expenses, and [illegible] per cent. by the 31st of December next, to comply with the standing orders of Parliament, and a further sum of 10 per cent. every six months afterwards, until a sufficient amount be raised; that the instalments bear interest from the respective times of payment—and that a clause be inserted in the Act, that no shareholder shall be responsible for more than the amount of his share.

Having now only to render this report into your hands, and resign their responsibility, the committee cannot but express their fullest confidence, that the dense population of the county, and its locomotive habits—the south-western position, unrivalled safety, and capabilities of its harbours, not exceeded by any ports in the kingdom—the salubrious localities, which have long been frequented by invalids, presenting mildness and uniformity of climate not surpassed by the South of France—the early productions of the soil—and the inevitable restoration to Falmouth of the packet establishment—will all contribute to produce a satisfactory return on the capital invested, and secure to Cornwall that pre-eminence it has always till now enjoyed, as the high road to the Indian, Peninsular, and Transatlantic portions of the world.

It was then unanimously resolved:—

Moved by J. T. Treffry, Esq., seconded by E. W. W. Pendarves, Esq., M.P.:

"That the report which has been read fully establishes the importance of a railway through Cornwall—that the present time offers great facilities for its construction, and that a company be now formed for the purpose of carrying it into effect, under the designation of the "CORNWALL RAILWAY COMPANY.""

Moved by G. W. F. Gregor, Esq., seconded by E. Turner, Esq., M.P.:

"That a provisional committee (consisting of subscribers holding not less than ten shares each), be appointed to organise and direct the proceedings of the company, to obtain the support of the capitalists and others interested in the measure, and to do all such matters and things as may be needful in carrying out the proposed object."

Moved by Mr. [illegible] Jenkin, seconded by [illegible] Fox, Esq.:

"That the following gentlemen be requested to form such provisional committee—

J. T. TREFFRY, Esq., Place House, Fowey, Chairman.
G. W. F. Gregor, Esq., Trewarthenick.
John Allen, Esq., Liskeard.
John Vivian, Esq., Pencalenick.
John Paynter, Esq., Boskenna.
William Carne, Esq., Rosemundy.
John [illegible], Esq., [illegible].
William Reynolds, Esq., Trevenson.
W. M. Tweedy, Esq., Alverton.
John Batten, Esq., Penzance.
R. R. Broad, Esq., Falmouth.
R. Davey, Esq., Perran Wharf.
Dr. Carlyon, Truro.
With power to add to their number.

And that the following officers of the company be appointed:—

SECRETARY—Mr. W. H. BOND.
ENGINEER—Captain MOORSOM.
BANKERS.
Messrs. TWEEDY, WILLIAMS, & CO., Cornish Bank, Truro, Falmouth, & Redruth.
SOLICITORS—Messrs. SMITH and ROBERTS, Truro.

Moved by W. M. Tweedy, Esq., seconded by Mr. Ellis:

"That the shares in the company be of the value of £[illegible] each—that £1 per share be paid forthwith, to meet the preliminary expenses—that, in accordance with the Standing Orders of Parliament, an instalment of 10 per cent. will be required to be paid previous to the 31st of December next; and that a further call of 10 per cent. be made so soon as the Act for the formation of the railway shall have been obtained, and the remainder at such intervals of not less than six months each, as may be necessary—that the several instalments bear interest from the times of payment, and that no shareholder shall be responsible for more than the amount of his share."

Moved by Mr. G. Smith, seconded by Mr. Rickerby:

"That the thanks of this meeting be tendered to the provisional committee for the great attention which they have paid to the important business entrusted to them; and also to Mr. Bond, the honorary secretary, for the zeal with which he has discharged his duties."

Moved by Sir C. Lemon, Bart., M.P., seconded by E. W. W. Pendarves, Esq., M.P.:

"That the thanks of this meeting be given to the Earl of Falmouth for his able and impartial conduct in the chair, and for the interest manifested by him in the important object for which this meeting has been convened."

*** The shareholders are requested to pay the deposit of £1 per share to the bankers.

Applications for shares to be made to the secretary, Mr. W. H. Bond, Falmouth.

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## THE PATENT SAFETY FUSE,

FOR BLASTING ROCKS IN MINES, QUARRIES, AND FOR SUBMARINE OPERATIONS.—This article affords the safest, cheapest, and most expeditious mode of effecting this very important operation. From many testimonies to its usefulness with which the Manufacturers have been favoured from every part of the kingdom, they select the following letter, recently received from John Taylor, Esq., F.R.S., &c., &c.:—

"I am very glad to hear that my recommendations have been of any service to you. They have been given from a thorough conviction of the great usefulness of the Safety Fuse, and I am quite willing that you should employ my name as evidence of this."

Manufactured and sold by the Patentees, BICKFORD, SMITH, and DAVEY, Camborne, Cornwall.

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## TO RAILWAY COMPANIES AND CONTRACTORS, COAL OWNERS AND IRONMASTERS, &c.

—BRYANT and MAY beg to acquaint the above named, and consumers of grease generally, that they have CONSTANTLY ON SALE GREASE OF VARIOUS QUALITIES, prepared for EVERY DESCRIPTION OF WORK, from the finest passenger carriages to the "ballasting" waggons. The highest testimonials can be given of quality—prices very moderate.

Orders may be addressed, samples and particulars obtained, at 135, Tooley-street, London.

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## WATSON'S PATENT IMPROVEMENTS IN DRAINING,

as applied to CANAL AND RAILWAY CUTTINGS, VIADUCTS, TUNNELS, and other ENGINEERING WORKS.—The draining of retaining walls, tunnels, embankments, and cuttings, by this patent, consists, for the most part, in inserting, to the requisite depth, in any direction and at suitable distances, cast iron pipes, of about three inches diameter, having numerous small holes or slits left in them; and by these apertures being formed wedge-form—viz., enlarging inwards, they do not become stopped as other holes would. Viaducts require draining as much as other works, and particularly if in wet situations. In erecting new works, the drain pipes may be built in at very small expense; and for old works, borings are now easily made by a machine, which, after much time and expense, has been brought to such perfection as to render boring through the hardest brick-work a safe and expeditious operation. This machine, working the patent cutter, has, in boring a 4-inch hole through a brick wall of the hardest description, performed between five and six feet in an hour. It is worked by manual labour, and bores in any direction and to any depth or length. Three men are sufficient to work it throughout the day, and its action is smooth and easy. Particular attention is called to the circumstance, that, when boring through clay with this machine, the sides of the bore are [illegible].

One great advantage afforded by this patent, is the ventilation that is procured in the works to which it is applied, and which will preserve building materials and consolidate earthwork. The borings are to extend not merely through the masonry, but some distance in the solid earth. As mortar will not harden if kept from the air, the importance of admitting air within masses of brickwork will be readily acknowledged. It may here be remarked, that holes bored for drainage, without the insertion of pipes, soon become choked and useless.

For wood pavements the drainage kept up by these pipes will be found particularly valuable. The pipes are laid underneath the blocks, being merely embedded in the concrete or other foundation, and communicate with the sewers. Gravel walks and parks in wet situations may be kept dry by the same means.

The price of the cast iron pipes, which are made in lengths of four feet, is [illegible] each. The charge for insertion varies according to circumstances. The proprietor will either insert the pipes himself, or sell them, and let on hire the boring machines. Clay tubes, eighteen inches long, and from four to twelve inches diameter, are also being made with moulded apertures. They can be used for many purposes, but are not suitable for inserting in brick-work.

The first attempts to bring this patent into practice were encouraged by Robert Stephenson, Esq., who has permitted the proprietor to state that he has the highest opinion of its utility in all cases of brick-work. The resident engineer of the London and Birmingham Railway, R. B. Dockray, Esq., allows it to be stated that the work [illegible] C. H. Gregory, Esq., of the London and Croydon Railway. The proprietor [illegible]—apply to

T. [illegible], [illegible], BUNHILL-ROW, LONDON.

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HER MAJESTY'S DOCKYARDS. 46

## SIR W. BURNETT'S PATENT having undergone NINE YEARS' TRIAL IN ALL CLIMATES,

is now in daily extensive operation in the above national establishments, as well as by many public companies and private individuals.

This PROCESS preserves TIMBER from DRY-ROT, and, when desired, renders it uninflammable.

It is cheap, innoxious, and easy of application.

It may be used in ordinary wooden tanks, and does not, therefore, require hydraulic machines, except for the sake of expedition.

It seasons the greenest wood in a very short time, and renders the commonest domestic timber equal to the best foreign.

CANVAS, CORDAGE, COTTON, and WOOLLEN are not only preserved from ROT, MILDEW, and the attacks of MOTHS, but are unchanged in colour, and rendered even stronger than before.

Numerous specimens and testimonials may be seen, and every information upon its objects and application will be given, at the company's offices,

[illegible], KING WILLIAM-STREET, LONDON-BRIDGE.

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## MUTUAL LIFE ASSURANCE SOCIETY,

ESTABLISHED [illegible]—[illegible], OLD JEWRY.

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ACTUARY—Peter Hardy, Esq., F.R.S.

Extract from the report of the directors of the society, to a general Meeting of the members, holden the 27th of January, [illegible]:—

"At the end of the six years which have been completed since the 31st of December, [illegible], there are in existence in the society three times as many policies as there were in existence at the end of the year [illegible]. The capital sums assured under those policies are nearly doubled in amount. The corresponding income derived from annual premiums is also nearly doubled. The accumulated property of the society is four times as great as it was at the end of that year, and the present divisible surplus is nearly six times as much as that declared in the division of the year [illegible]."

The directors invite the public to compare the following table of the additions made to the ten oldest existing policies in the society, up to the 31st of December, [illegible], with the additions made by other societies within the same time:—

| No. of Policy | Sum assured. | Premiums | Age at admission. | Total addition made in [illegible] | Increase in [illegible] | Total addition made in [illegible] | Amount of premiums paid. | Total addition is equivalent to the following per centage on amount of premiums paid. |
|---|---|---|---|---|---|---|---|---|
| 1 | £1000 | £[illegible] | [illegible] | £[illegible] | £[illegible] | £[illegible] | £[illegible] | [illegible] |
| 2 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 3 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 4 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 5 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 6 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 7 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 8 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 10 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

PETER HARDY, Actuary.

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MUTUAL ASSURANCE. 48

## SCOTTISH AMICABLE LIFE ASSURANCE SOCIETY,

HEAD OFFICE—141, BUCHANAN-STREET, GLASGOW.

The constitution and regulations of this society insure to its members the full benefits which can be derived from such sums as they are willing to devote to the important duty of life insurance. The whole profits are secured to the policy holders by the mutual system—on which the society is established, and their allocation to the members is made on fair, simple, and popular principles.

It is provided by the rules, that the whole directors, ordinary and extraordinary, shall be members of the society, by holding policies of insurance for life with it, of more than three years' standing. This rule secures to the public that those noblemen and gentlemen who appear as directors of the society have practically approved of its principles.

EXTRACTS FROM THE TABLES.

| 1. Extract from the Tables of Premiums for Insurance of £100, with additions at death. | | | 2. Table showing the sums which the additions on a policy of £100 will amount to, according to rates hitherto declared. | | 3. Extract from the Tables of Premiums for Insurance of £100, without additions. | | |
|---|---|---|---|---|---|---|---|
| Age | Annual payments for life. | Annual payments ceasing after 60. | Amount. | At end of years. | At death, [illegible] | At death, or on attaining 60. | Age |
| [illegible] | £[illegible] | £[illegible] | £[illegible] | [illegible] | £[illegible] | £[illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

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Prospectuses, with full tables, may be obtained at the office in London, and every information afforded in regard to the best mode of carrying out the intentions of parties proposing to insure.

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## DISEASED AND HEALTHY LIVES ASSURED.

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[illegible]

This office is provided with very accurately constructed tables by which it can assure UNSOUND LIVES on equitable terms.

The EXTRA PREMIUM discontinued on restoration of the assured to permanent health. [illegible]

## ORIGINAL CORRESPONDENCE.

### THE SAFETY LAMP—ITS INVENTOR.

**Sir,**—Dr. Clanny has very properly declined further controversy with so unscrupulous an opponent as Mr. Murray. After the insinuation in Mr. Murray's letter, contained in the present Number of the *Mining Journal*, I might imitate my friend, but I have two reasons for replying—1st, I am not quite willing to let Mr. Murray off so easily; and, 2d, I wish to say something with regard to Dr. Clanny's position in the matter of the invention of the safety lamp. Mr. Murray, then, is very wise in refusing to say more on the subject with him—discretion is certainly the better part of valour; for was there ever a clearer case in this world of a shallow and mendacious invention, convicted and exposed, than we have afforded by Dr. Clanny's challenge to him to support his claim, and by his negative answer? We have an eminent man, long dead, accused at an interval of thirty years of the meanest trickery and imposture. We have Mr. Murray's claim put forth, at first, without the smallest reference to the eminent person whose merits could, perhaps, afford, without much loss, such a position as might serve to set up his namesake as a philosopher. We have then Dr. Clanny's announcement that the safety lamp in question was precisely that of Dr. J. Murray. In reply, we are told that the invention was made known in an unheard-of work, and that it was communicated to Dr. Murray, who made use of it in a more barefaced manner, certainly, than was ever done before. Dr. Murray must have been an impudent fellow, truly! Mr. Murray takes advantage of an evident misprint in my letter, *Rec.* for "record," to insinuate an accusation of falsehood against me. So little does he know of the persons about whom he speaks, so little of chemical literature, that he is not aware of the fact of Dr. Murray's works being for several years after his death edited by his son, Mr. J. Murray, afterwards Dr. J. Murray. Dr. Clanny's position in regard to the safety lamp may be stated briefly as follows:—He was the first person to invent a safety lamp, and to make trial of it in a highly explosive mine—he it was who kept alive attention to the subject. There is reason to believe that he was on the right road to the discovery of the principle of safety in the use of wire gauze, or capillary tubes, when Davy became acquainted with his ideas on the subject, and worked them out. Holmes, in his work *On Coal Mines*, pages 203 and 204, distinctly assigns the merit to Clanny, and the Parliamentary report goes nearly the same length. Moreover, Dr. Clanny's lamps have two merits, neither of which is absolutely possessed by the Davy—viz., they are lamps, they give light, and they have never been proved unsafe. His most recent lamp is a beautiful invention, but, as I am about to make experiments with it, I shall say no more of it at present. In conclusion, Mr. Murray is so kind as to say that he never heard of me before. I am heartily glad of it; for, unlike the late Dr. Murray, I cannot afford to lose the reputation of the little, the very little, that I have done in science, and the circumstance of my labours having received the sanction of the Harveian Medical Society, or being found mentioned in some three or four reports of the British Association, or in the *Philosophical Magazine*, or in the annual report of Berzelius, or some half-dozen journals, might be no protection from so enterprising an individual as Mr. Murray. Most sincerely do I hope never to know more of him than I do at the present time. R. M. Glover, M.D.

*Northumberland street, Newcastle-on-Tyne, Feb. 4.*

P.S.—The reason why I do not consider the experiments before the Parliamentary committee to have proved Dr. Clanny's lamp unsafe, I shall give when I transmit an account of my experiments on his present lamp.

### DR. CLANNY'S LAMP, &c.

**Sir,**—As I would "nothing extenuate, or set down aught in malice," I beg to quote the following paragraph touching Dr. Clanny's lamp, in reference to the experiment made before the Parliamentary inquiry in 1835, in evidence of the justice of my remarks respecting its insecurity:—

REPORT OF SOUTH SHIELDS COMMITTEE—p. 16.

It does not secure against the passage of the flame through the gauze; in this point it acts in a similar way to a common Davy lamp. In an experiment before the committee of the House of Commons, with four measures hydrogen and one [illegible] gas, it was [illegible]. This description of lamp will not, then, guard against [illegible] blowers of gas or strong currents; therefore, the invention of Dr. Clanny is not a safety lamp, &c.

I see Dr. Clanny has translated the often quoted latin extract, for our "good to edification," though I will not pay your readers so sorry a compliment, as to my quotation, seeing that Dr. Glover, to whom it pertains, must be able to scan its import, and he will also know that it should have been "*nodaque* [illegible]," but the misprint is not mine. I am truly glad that the culture (*qui humum* [illegible]) are so goodly a race, and cut so respectable a figure in the *beau monde*, and that he who ranks himself one is, on the "theory of probabilities," not likely to be hanged, seeing I have an instinctive horror to public executions, as an act of high treason against the Author of Life, who is alone invested with the prerogative to take it away.—*Feb. 7.* J. Murray.

### IMPROVEMENTS IN THE MANUFACTURE OF IRON.

**Sir,**—I rejoice to find that the discussion on Mr. Rogers's "discoveries and inventions" (which, by-the-bye, your correspondents seem to be rapidly curtailing) is likely to bring the merits of Mr. Clay's patent into prominent relief. I was a few days back an eye witness of the process in most successful operation, of which more anon. It will be desirable if your intelligent correspondent, "A Looker-On," can give more particular details as to the way in which Mr. Clay's patent right is assumed to be avoided in the Nantyglo operation—I refer to the weights and analysis of the materials employed; for it appears to me, that if the mixture of the black-band and coke dust contain certain relative proportions of carbon and oxide of iron, the patent cannot be evaded; and, as to using the black-band in its uncalcined state, that also is provided for in Mr. Clay's specification, which has been furnished to me very lately, and which states—"I take any of the rich ores of iron, or such as may contain 45 per cent. or upwards of that metal, or any of the earthy stones, carbonates of iron, or other ores, which, when calcined or roasted, may contain the quantity named, and to 100 parts of such ore add so much carbon;" and, subsequently, instructions are given to ascertain when the proper quantity of carbon is used. Now, it is clear to me, that the clause was thus worded to provide for black-band, or such descriptions of carbonate of iron being used in their uncalcined state—and, in fact (though it may rob Mr. Rogers of another feather), the intelligent manager of the Muirkirk Works tried this very plan with the uncalcined Ayrshire black-band, as one of the first essays with Mr. Clay's process! If, however, the Nantyglo black-band makes good iron by the process named, it must be a description not generally; and, before the "discovery" (or piracy, as it may turn out) is more extensively trumpeted, I should like to have the verdict of a jury of blacksmiths as to its red-shortness, &c. "A Looker-On" is right as to Mr. Mushet having long since pointed out the practicability of producing wrought-iron direct from the rich ores, by cementing them in close vessels, with charcoal, &c., and many persons are now living who witnessed the process in operation near Whitehaven, but its tediousness requiring some days for heating, some days for deoxidising, and some days for cooling (about ten days altogether), brought the plan rapidly into disuse, and the production of wrought-iron direct from the ore lay dormant, until Mr. Clay's adoption of a much larger dose of carbon (to combine with the atmospheric oxygen of the open furnace, as well as with what is contained in the ore) enabled a common reverberatory, or puddling-furnace, to be used, and the reduction of the ore to be effected in an incredibly short space of time, as compared with the cementing plan—probably, from the fact, that deoxygenation proceeds in a ratio as the square of the degree of heat applied. Be this as it may, and leaving the invention or creation of Mr. Clay's by the Nantyglo process to the parties concerned, and their lawyers, I now proceed to detail facts under my own cognisance—facts which I trust may be welcome to some of your readers, as an inquiry was lately made through your columns, and repeated in the last Journal, as to the practical adoption of Mr. Clay's patent. I have not asked the permission of the parties who so kindly permitted me to witness the process to publish the name of their works; I therefore send it to you in confidence herewith, with my own name as a voucher. A mixture of 300 lbs. of Ulverston ore [illegible], and 100 lbs. of coke finely ground, were mixed together, and thrown into a common puddling-furnace; it was lightly stirred about by the "underhand" for twenty-five minutes or thereabouts, until it became slightly adhesive; 310 lbs. of a mixture of Welsh and Scotch hot-blast pig, No. 3 or No. 4 in quality, was then added; when melted, it was thoroughly worked up with the ore, each bringing the other rapidly up to Nature "and was balled in the usual way." The yield, with these proportions, as an average of the last twenty heats made, was 432 lbs. of puddled bar-iron, of excellent quality, and such, as Dr. Colquhoun designates it in his admirable report on Mr. Clay's process, of "remarkable properties," free from the slightest trace of red-shortness, and requiring only once piling to produce best chain cable iron. The workmen got six "heats" per "shift," the same as if they had used a mixture of pig and plate-iron, as on the old system, and were receiving, I believe, the same rate of wages. Now, if the whole weight of the pig-iron be taken from the product, it would leave 122 lbs. as the yield of the ore, or 40⅔ per cent.—a return sufficiently satisfactory in itself; but the carbon, silicon, &c., of the pig-iron would probably reduce its "yield" one-ninth—that is, 22½ cwts. of pig would not give 20 cwts. of puddled bars.* We should take, then, from the 310 lbs. of pig one-ninth, or 34⅓ lbs., giving 275⅔ lbs. as the yield of the pig, 156⅓ lbs. as the yield of the ore, or 52⅓ per cent. out of the 62 to 64 which it contains by analysis! If it had to undergo the old system of smelting, refining, puddling, &c., how much per cent. should we have? The advantages of Mr. Clay's plan do not terminate with this extraordinary yield. There are these additional ones:—1. The admixture of the red ore raises the quality (so to speak) of whatever pig it is mixed with, for the fact is as true as strange, that, let it be "cinder" or "hot-blast pig," as good iron is made as if the best cold-blast or plate-iron had been used, with or without the red ore. 2. There is thus no necessity for refining, and all the cost of its operations is saved. 3. There is no such destruction of the furnaces as when pig-iron is boiled—the deoxidised ore appears to protect them. 4. The tap cinder becomes as valuable as it was previously valueless; being principally the product of the red ore, it possesses all its peculiar excellence, and, as pointed out by Dr. Colquhoun, is comparatively free from those phosphates which are the ruin of the common tap cinder. With all these facts staring them in the face, whose fault is it, that, even at the present prices, the iron trade is ruinous? What can be the nature of the "vested interests," that prevents the general adoption of a mode which would—in South Wales, at least—raise the reputation of the quality of their iron from its present bad odour, while it would leave what most people would consider to be a sufficient profit? Our red ore can be laid down at Newport or Cardiff at the present time for 14s. per ton; I know not the cost of carriage to the works—say, it is 3s. per ton; then the cost of puddled bars on Mr. Clay's plan would be:—

800 tons of Ulverston ore, at 17s. (?) .................. £680
100 ditto small coke, at 5s. (?) .................. 25
310 ditto of No. 3 or No. 4 pig, at 50s. (?) .................. 775—£1480

Produce, 432 tons puddled bars, costing per ton, exclusive of coals, wages, &c., 2*l.* 7*s.* 5*d.*, or 2*s.* 7*d.* less than the pig-iron. If the latter be considered as estimated too low, then will the saving be greater; for on the above data at 3*l.* per ton for the pig, the metal of the puddled bars would only cost 2*l.* 14*s.* 7*d.*, or 5*s.* 5*d.* below the cost of the pig! If a "Looker-On" be correct in stating the cost of No. 2 bars at 16*s.* or 17*s.* per ton (!) materials included, I must be safe in reckoning the labour and coals at not more than this sum—then, 2*l.* 7*s.* 5*d.* + 16*s.* = 3*l.* 3*s.* 5*d.* as the cost of best chain cable iron; and I expect my jury of blacksmiths would give the difference of price, say 2*l.* 10*s.* per ton more for iron made from Welsh pig and Ulverston ore, than for Mr. Rogers's raw blackband material—time may show. From the date hereof, your readers may say I am an interested party in this matter, I disarm them at once by stating that I am. The paralysis of the iron trade, and the consequent disuse of much red ore, has produced great distress in this district, and I am anxious to see this disease removed. The excellence of our mineral, and its peculiar adaptation for Mr. Clay's process, convinces me that it should not, as is now the case, be the greatest sufferer by the stagnation of the iron trade, and if the South Wales masters, who seem, by locality, to be the best situated for bringing it into consumption, decline to do so, there can be nothing for it, but erecting works nearer home, for the more general adoption of the plan.—*Ulverston, Jan. 29.* Red Gauntlet.

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* I believe no such return can be got but at the costly expense of continually renewing the bottoms and sides of the furnaces, and protecting them with roll scale, red ore, calcined mine, &c.

### IMPROVEMENTS IN THE MANUFACTURE OF IRON.

**Sir,**—With regard to an anonymous communication in your last week's *Journal*, signed "*A Looker-On*," and dated (although I suspect erroneously) "Nantyglo, *January 11th*," I would simply observe, that the writer of it is only fishing for information upon subjects he at present is lamentably ignorant of, and that by a mode which none but the low and the vulgar—and it may with truth be added, the arrogant and the impudent—ever resort to—viz., by bullying and abuse. His ignorance of the subject is manifest, in the first instance, from his vague and evasive observation—"*I understand* the invention of iron bottoms to puddling furnaces originated with Mr. Harford, of Ebbw Vale, who took out a patent for the same;" that the understanding of this anonymous scribbler is either very much warped, or very defective, is the only rational construction that can be come to on this business, by parties who really know the progress, the state, and the usages, of the iron trade; for, if Mr. Harford's patent included the use of "iron bottoms to puddling furnaces," how came it that these bottoms have become generally adopted in the trade, and that without the proprietors of other works either asking or paying for permission (as is customary under all patents) to make use of them? A more glaring specimen of the ignorance of the writer in question on this subject could not well be given, and his impertinence (but ignorance and impudence are acknowledged universally to be inseparable companions, and very bold and brave fellows they will sometimes appear, whilst under a mask) in challenging, upon the unsupported conjectures of a shallow and defective understanding or mind, my statements in your *Journal* of 6th instant, by a point blank denial of them—1st, under a disguise; 2d, in uncourteous language; and, 3d, with most malicious intentions, in a publication that goes, as it were, to the remotest corners of the scientific world—when, from his residence near to, but not at, Nantyglo, he may, if truth had been his object, or a single spark of honour had existed in his "burning bosom," have had all his *bona fide* inquiries on the subject fully answered, merely by civilly and personally making such a request; this must be conclusive proof that the object of the ignoramus in question was not the attainment of authentic information on the business, but merely to detract, as far as in him lay, from any credit that may be given to me for the introduction of certain improvements in iron making. Now, the real history of the successful application of iron bottoms to puddling furnaces is simply this, and, therefore, mark how soon and effectually a "plain tale" will put the malignant and anonymous detractor down. In a manuscript treatise on iron metallurgy, written for [illegible] practice in the trade, about the year 1818, I proposed the use of "iron bottoms," in order to avoid the mechanical and inevitable admixture of sand with the iron in puddling upon sand bottoms. To this proposition objections were started from almost all quarters, and by parties of the best experience in the trade—it was, indeed, put down as a complete impossibility, for I was told, that iron bottoms had been tried repeatedly, as well at Cyfarthfa, at Dowlais, and at Llanelly, and almost many works in Staffordshire and Shropshire, and everywhere with the like result—viz., they melted away at the full temperature of a puddling-furnace, like so much pig-iron. Now, my usual way of proceeding, in all strange and doubtful cases, is to trace every effect up to its source; in pursuing this plan on the subject in question, I found, upon inquiry, that all attempts, up to that time, to introduce iron instead of sand bottoms, were made by casting, and even forming, dish shaped iron plates, from five to six inches in thickness, to suit the working cavity of the puddling furnace, and then setting them upon a bed of solid brick-work, with well rammed fire-clay; the natural consequence was, a fusion of the bottom as soon as the temperature of the furnace came to a full working heat; these were nearly the exact words made use of by the (at the time) largest ironmaster in South Wales, when I proposed to him, in the presence of two of his principal agents (one of whom is still alive, and the ironmaster also), my new method of introducing iron in the place of sand for the bottoms of the furnaces in question. Proceeding with my inquiry, I found that the sides of what are called "Roe's boxes" were made of cast iron, and that they were exposed to quite as high a temperature as that which was generated in a puddling furnace, and yet the iron sides of these boxes were very seldom melted, although frequently burnt away from two inches in thickness to less than an inch. Here was another fact to ruminate upon; a very little reflection then clearly satisfied me that the reason why these "iron sides" did not melt away, was the exposure of one of their surfaces to a free current of cold air—hence the difficulty with regard to the introduction of "iron bottoms" immediately vanished, and the principle I proposed was, to put such bottoms into the furnaces, so that a current of cold air should freely circulate in contact with, and beneath them. This is the true history of the "first of my inventions," as alluded to in my letter in your Journal of 6th instant, and which, if it be not an invention, and one that has enabled the ironmasters of this country to more than double, and, in some instances, treble, their make of puddled bars, then I must be content to confess myself entirely ignorant of the term invention, and also unacquainted with the benefit such invention has conferred upon the iron trade generally, by enabling the operator to produce a result entirely free from any mechanical admixture of sand from the bottoms of his furnaces—a point that the miserable understanding of "A Looker-On" has, up to this moment, not been sufficiently opened to fairly comprehend. The [illegible] of the ignorance of this scribbler, whose chief delight is to dwell in darkness, because he "loveth darkness better than light," in the [illegible] assertion that my "second invention" is only the same thing as the "[illegible], Hill, of Plymouth Iron Works, near Merthyr, had also secured to them by patent." Truly, Mr. Editor, without a tithe of your acuteness, a great number of your readers, and a great many of my friends, at distant, friends and patrons, will, when they come to hear of such an assertion—even though it be notoriously false and empty, and the mere excrementatious discharge of a pestiferous brain—imagine I have let slip from my memory everything it has heretofore known with respect to the materials and processes used at iron works. All that I shall say on this point, therefore, is, that as "A Looker-On" manifestly is upon a wrong scent, as well as perfectly ignorant as to what this "second invention" really is (an invention that shall be freely communicated to any respectable ironmaster, on their making a civil and proper application for it), I will not irritate his sensitive nerves, "astound" his little, pinchbeck mind, nor stir up the "envy, malice, and uncharitableness," of a mere dabbling pretender, as to matters in which he has not the remotest concern, nor the least practical knowledge whatever, by satisfying his desire to have something upon which he may pour out the overflowings of his gall, for the amusement of similar empty heads, weak and shallow understandings, and venomous and detracting hearts, as appears to have fallen to his lot to possess. I find it impossible to conclude these remarks within the reasonable limits of a newspaper letter, and will, therefore, forward you the remainder in due time for publication in next week's Journal.

*Nantyglo, Jan. 24.* S. B. Rogers.

### THE COLLIERS' MOVEMENT—"MINERS' ASSOCIATION."

**Sir,**—In perusing the late Numbers of your Journal, I find a series of articles on the colliers' movement, from the tenor of which I infer that it is your wish to do justice to the workman, as well as the master. As an individual practically acquainted with the objects of the movement, and feeling it to be my duty to correct what I see wrongly stated, I beg permission, through the medium of the *Mining Journal*, to point out to your numerous readers a few important particulars wherein you have been misled.

When this association commenced, its objects were, and are still, to unite in one body the whole of the miners of Great Britain and Ireland—that being accomplished, it further intends to attempt to persuade the masters, that, by acting in concert with their workmen, moderately good wages could be secured for the same, and also a fair return for the capital of the master, as you will perceive from the circular annexed, a copy of which has been sent to all the coalowners of the Tyne, Wear, and Tees, and on some of which a strong impression has been made of the utility of the scheme. I am sorry to say, that such impression is not so general as we could wish, yet it is spreading, and, no doubt, will become so extensive as to lead to the most happy results by its adoption. As, no doubt, many of the masters have not seen the same, by copying it into your Journal you will much oblige, Your's, &c., Martin Jude.

*Newcastle-on-Tyne, Feb. 3.*

Gentlemen,—We, the members of the Miners' Association of Great Britain and Ireland, do hereby set forth and declare what our objects and intentions are in forming the above association; and we feel it our duty to do so on account of the many and serious reports got up and set abroad by parties whose own conscience we choose at present to say must decide the motive for so doing. Our object in forming the above association is to better our condition, and we beg to apprise you that we would rather by far that that would be done by an amicable adjustment of all differences than by having recourse to a strike, which we feel inclined to believe is equally disadvantageous to you as to us, and the inevitable result of which would be to engender feelings of such a kind as ought not to exist between master and servant.

We intend to lay before you the following specific and simple plan—viz., that each colliery owners shall be furnished with a copy of such prices as shall be thought necessary and reasonable, and which it is intended to go on the principle of making the cost price, as far as labour is concerned, equal or nearly so on every colliery in the trade, and to such uniformity of cost price the masters to add what they may deem a proper and reasonable return for their capital; it being our firm and decided opinion, that as we risk our lives and you your money to dig from the bowels of the earth a commodity on which it may truly be said the existence of Great Britain as a nation depends, it is not too much to request that the price of that article shall be such as to give ample remuneration to both the labour and capital employed.

Something of this kind must be done. We have had to submit this year to a very great reduction of prices, and we opine if you, as coalowners, get once into the path of ruinous competition by underselling each other in the market, and then endeavouring to reduce the wages to still keep a market, is a process alike ruinous to both parties, and which must have a tendency to keep up a contentious war of strikes and stagnation—labour and capital contending for the mastery; while the public, who, as consumers, reap the benefit, without so much as soiling a finger in the dangerous undertaking of raising an article indispensably necessary to their comfort and existence. The moral and the physical consequences of a contentious warfare between capital and labour does appear to us to be fully illustrated by the fable of two noble animals combating or fighting for a piece of prey, and while the combat was going on another animal of diminutive size and strength came and carried off the prize; while neither of the two, such was their state of exhaustion, could prevent it.

To conclude, we entreat you to bestow on this, our earnest and sincere requisition, your careful and best consideration; and if you should be pleased to agree with us as respects the principle on which it is founded, it will be alike creditable to your judgment and your interest.

The Members of the Miners' Association.

[Some observations on this communication will be found in another column.]

### DIRECT ACTION MARINE ENGINES.

**Sir,**—We shall be obliged by your inserting this, and the copy of correspondence below, in the next Number of the *Mining Journal*.

*Mostyn Foundry, Feb. 7.* Eyton Brothers.

TO THE EDITOR OF THE ARTIZAN.

**Sir,**—We have just seen the plate you have lately published, containing plans of various direct action marine steam-engines, and we are surprised to see among the number one attributed to Messrs. Bury and Co., of Liverpool, which, as far as we can see and comprehend, without descriptive letter-press, is in principle the exact counterpart of a pair of marine engines we projected in the spring of the year 1841, and brought into use on our steamer, the *Talisman*, in the summer of 1842.—[See notice of these engines in the *Mechanics' Magazine* of July, 1842; extracted from a local newspaper.] We had heard, from various quarters, that Messrs. Bury and Co. were making a pair of engines after the plan of ours, but we could never have believed that they would appropriate the invention to themselves, nor do we yet know it, except as far as your plate assigns the invention to them. We hear that the engines built by Bury and Co. are placed on the lately-launched *Nimrod* steamer, plying between Cork and Liverpool, and that there are some deviations from our plan, but whether these are improvements time will show. There is a hitch somewhere, as the machinery is, if we are rightly informed, now, or was very lately, under the doctor's hands. As regards our priority of invention, Mr. Lloyd (the chief engineer at Woolwich Dockyard), the authorities at the Admiralty and Trinity House, Mr. Fairy, and various scientific and practical men, will bear undoubted testimony to it, and, as regards efficiency, the performances of our little boat speaks for itself, for the speed and regularity of her trips between Liverpool and Mostyn, the station whereon she is placed, is proverbial. She only missed going out of Liverpool once during the stormy winter of 1843, and that was the day when the Halifax Post-office steamer dared not leave Liverpool on her outward voyage, and she has not missed one day this winter. We trust that you will set this matter right in your promised description of the plans set forth in the plate in the January Number of the *Artizan*, and you will oblige Eyton Brothers.

*Mostyn Foundry, Holywell, North Wales, Dec. 16.*

TO MESSRS. BURY, CURTIS, AND KENNEDY, STEAM ENGINE MAKERS, LIVERPOOL.

Gentlemen,—We beg leave to transmit you a copy of a letter which we addressed in the month of December last, to the Editor of the *Artizan*, on the subject of the direct-action marine engines, said in the November Number of that periodical to be invented by you, and placed on the steamer *Nimrod*. We expected that some notice, at least, would have been taken of our prior claim to the invention in the long-promised article on "Direct Action Marine Engines" in the *Artizan*; that article at length appears in the Jan. Number of the *Artizan*, published on the 1st inst., and we find that the Editor persists in according to you the full merit of the invention, from which we conclude that you sanction the claim. This we wish to be understood that we deliberately and distinctly deny, and we repeat our assertion, that your engines are a copy, and (on account of the variations) an indifferent copy, of the engines erected and at work on our Liverpool and Mostyn steamer, the *Talisman*, nearly eighteen months before your's were completed. We had serious thoughts of taking a patent, and with that view previously showed our plan to Mr. Robertson, the talented Editor of the *Mechanics' Magazine*, in July, 1842, but it was considered that we were too late, as the engines had been then nearly three months in public use. We had a delicacy of addressing you until the Editor of the *Artizan* had given some sign, but we now consider that delicacy is entirely out of the question, and, accordingly, we shall not scruple in making this public.—*Mostyn Foundry, Feb. 7.* Eyton Brothers.

### PERFORMANCES OF STEAM ENGINES.

**Sir,**—Being a subscriber of your valuable and widely-circulated *Journal*, I should feel obliged by your scientific correspondents to inform me of the performances of condensing and non condensing engines, in regard to the quantity of fuel required to realise a certain performance. I should wish the result from engines working at full pressure, or as near as they can do so by the usual [illegible] governing; we are aware that some different opinions exist on the subject in the minds of many. Also, at the same time, I should wish their advice, whether there is much difference in respect of fuel, if the steam is used at 20 lbs., 40 lbs., or 50 lbs. pressure at the boiler, and also what part of that pressure ought to be calculated upon to ascertain the power of non-condensing engines, or its performance. I should wish their sentiments on the openings to and from the working cylinder. C. K.

*Etruria Iron Works, Staffordshire Potteries, Feb. 3.*

[The required particulars being of general interest will, doubtless, attract the attention of correspondents, to whose favours we should readily give insertion.]

## ON THE COMPARATIVE MERITS OF ATMOSPHERIC AND HYDRAULIC PROPULSION.

SIR,—The above being the title given by "*Æolus*" to his letter in your Journal (Jan. 27), I adopt it as the heading of this also—and, as in his letter he institutes a comparison between the atmospheric and hydraulic railways, it is incumbent on me to follow, in this reply, the course which he has marked out. I beg to congratulate "*Æolus*" on his coming forward in a manly spirit, and offering his sentiments, whichever way they may incline, with frankness on the two systems, before the scientific and engineering classes, and the public at large. It is a course becoming an honest intelligent mind, and worthy of a gentleman. Discussion is most desirable on both systems, though many respectable parties may not yet have perceived its necessity; but, sooner or later, every invention has to pass through this ordeal, and, if it pass through unscathed, the trial stamps its value. So strong has been my impression on this subject, and so forcible my conviction that the public look on *ex parte* statements with something bordering on suspicion, that I have omitted no opportunity, conveniently within my reach, to have my invention of hydraulic propulsion (borrowing an expression much to the purpose) "well hauled over;" and, if this letter does not throughout prove satisfactory, I now respectfully call on "*Æolus*," or any other party entertaining further doubts of the practicability and marked advantages of the hydraulic railway, publicly to propose them again—objections not so proposed would, in the eyes of many, look very like charges to which no answer was desired. It is thus, through the public press, that in every branch undue pretensions and erroneous anticipations are set at rest, that the cause of real science is advanced, the durability and worth of its adaptations proved, their beneficial results rendered fully available to the community, and the permanency of inventions, thus established—finally secured. In order to avoid trespassing beyond reason on your valuable and crowded space, with detailed explanations of mechanical and hydraulic arrangements, I perceive I shall several times in course of this letter be constrained, as I have on some former occasions, to refer to the pamphlet I have published on this invention—and which you are aware I have made arrangements for being procured at your office, as well as at Mr. Weale's, High Holborn. "*Æolus*" is correct in supposing "the application of the power derived from either of these (atmospheric and hydraulic) principles to be the same—viz., a pipe placed between the rails." This pipe has long been open to the public; accordingly, though the patentees have in both cases availed themselves of it, it constitutes no part of patent in either system. But your correspondent is quite mistaken when he implies that this pipe must be "continuous" in the case of the hydraulic, as well as in that of the atmospheric railway. In the latter this is requisite, as the driving power of the atmospheric system is, beyond dispute, very small, indeed, when compared with that of the hydraulic—namely, as one is to eight, or, say as one is to twelve, if the gentlemen of the atmospheric should find it in practice expedient to exhaust only up to half an atmosphere—and it must be remembered, that the higher the exhaustion the less is the quantity of air expelled each stroke of the air-pump. Thus, at half an atmosphere, the air-pump during the first half of every stroke, is employed in condensing its contents up to the atmospheric pressure, and during the other half stroke, it expels the half cylinder full of air. At three-quarters vacuum, the pump is employed in compressing the first three-quarters of each single stroke, and for the last quarter is engaged in expelling the air; which in this case, when brought up to the ordinary pressure, amounts only to one-quarter of the contents or capacity of the cylinder. In the hydraulic system, however, the propulsive power is so very great, that it would be mere waste of force to keep it constantly applied; it is, therefore, used only as the requirements of the case may dictate.—(See pamphlet, entitled *The Hydraulic Railway*, pages 29, 33, 47, and the two following, and the *Mining Journal* of March 11, 1843; also, see *Railway Times* of Nov. 19, 1842, in further illustration of the subjects of velocity and momentum.) "*Æolus*" is of opinion, that "on the atmospheric plan, the flexible valve would not be liable to ineffectiveness from the weather. Is he aware that every description of grease (and it is sealed with grease) hardens much with the increased coldness of the weather?—Is he also aware that, to obviate this, the patentees, or their immediate friends (if my recollection is not very much at fault), proposed sometime back to change the grease they use, and alter its consistency as the weather may render necessary?—Lastly, is he aware that oil, which is the softer grease must, under one character or another, be freely used, very easily freezes? But he thinks that on my plan the flexible valve "would most assuredly be frozen fast during the winter season, and rendered inoperative." He is not, then, aware that in the frosts I should convert the water into a rather weak brine, which does not freeze at our temperatures. On this subject I particularly beg to draw his attention to the remarks to be found in the pamphlet at page 76. In the course of those remarks, he will find that I purpose working the water over and over again. Who that has studied the matter at all, would suppose that I should not? "*Æolus*" will now perceive that his observation in the latter part of his letter, on "the serious expense which might be daily incurred in procuring the element," has arisen entirely from an erroneous impression on his mind. The fact is, I should not consume so much water as is required on the present locomotive system. Each of the large engines on the Great Western Railway evaporates 200 cubic feet, or more, of water per hour! Thus, in the *frosts* (not during the whole of the winter season) I should have to convert the water into a very moderate brine, and this cheap process would be effected in half an hour. How long it may require for parties of two or three men, working along the line at certain distances, on the atmospheric plan, to lift the heavy weighted continuous valve, to scrape the grease out of the slot and to replace it by other of a softer consistency, it is not for me to calculate—nor to inquire at what fall of temperature this softer grease will congeal. I now approach the two remaining material statements in the letter of "*Æolus*," one refers to my system, the other to the atmospheric—and they are both founded entirely in error. In the first, "*Æolus*" supposes the intelligent and able patentees of the atmospheric aiding their weak amount of propulsive force with "a store of compressed air always on hand, contained in spherical reservoirs, made of malleable iron, capable of withholding immense pressure, and obtained without cost of conveyance." "*Æolus*," then, must imagine the principle of the present atmospheric system similar to that of one or two of the first patentees of aerial propulsion, who proposed to inject a volume of air, above atmospheric pressure, into the pipe behind the travelling piston, and to cause it to propel this piston, with the train attached, forward, forcing out the horizontal column of air in the pipe before the piston as it advanced; this principle never succeeded. That of the atmospheric railway is, to evacuate the pipe before the piston of a certain portion of the volume of air it contains (I believe from one-half to three-quarters), and to apply the difference of pressure between that of the air still in the pipe, and that of the atmosphere acting behind the piston, as the propulsive force—a difference which is, and must be, considerably under the pressure of one atmosphere.—(See the nature and amount of my propelling power, which it becomes my duty to place in juxta-position in the pamphlet, pages 27 to 30 and page 32—and that of the locomotive system at page 42.)

The second erroneous idea of "*Æolus*," to which I have above alluded, refers to "elevated reservoirs," up into which it is clear, he imagines I must force the water, in order to obtain the requisite pressure. It is thus that new inventions have to struggle their way against, and gradually rid themselves, not of real, but imaginary difficulties! There is not one word in the pamphlet to authorise the assumption, and there is a great deal to give it a direct negative. Still, I am not surprised the idea is abroad. One party, in his periodical, assumed that I should require reservoirs raised on brick towers, 200 feet high, erected at intervals along one side of the line. Monstrous conceptions of a blundering brain! My reply to his absurd statements, which was given seriatim, and unexceptionable in point of style, he declined to publish; but you, Sir, afterwards, with your accustomed liberality in the cause of science, most handsomely inserted it in your Numbers of Jan. 14 and 28 last year; and to which I beg "*Æolus*" will refer. I will only add here, that, instead of such reservoirs, I shall force, without [illegible], the water slowly into the lower part of each of my propulsion reservoirs, or power stations, and under the considerable air pressure which these vessels will contain—in fact, equal to that of a vertical column of water, about 200 feet high—and keeping it thus stored up till required, I shall afterwards allow it to discharge itself with extreme velocity up the propulsion pipe as the train passes, and its powerful driving agency is called for. These vessels, by the way, are, in principle, very like the "spherical reservoirs" which "*Æolus*" erroneously attributes to the atmospheric system. On the subject of these power stations, see pamphlet, pages 30, 33, and 39. Before concluding his letter, "*Æolus*" refers to "leakages." Has "*Æolus*" never observed the mains of any water-works' company? Do those mains leak materially? and, if they had been laid and joined with the attention and accuracy which would be attended to in fixing the piping of the hydraulic railway—if, also, they were above ground, and open to observation, as the hydraulic pipes would be—would those mains leak at all? Whenever it becomes in my power to give this invention the practical experiment requisite fully to confirm the confidence of the public, objections of this sort, I feel assured, will be heard of no more. When "*Æolus*" alludes passingly to the "greater wear and tear" of my system, I submit he writes injudiciously. He should *prove it*, or, at the very least, give us some slight notion of his grounds for this opinion. I beg now to ask "*Æolus*" in what the great wear and tear of my system consists? Even when the continuous valve, or the gills of the piston, begin to wear, the caoutchouc can easily be dissolved, and again applied in the formation of a new piston or new gills.—(Pamphlet, page 82.) On the other hand, I would respectfully ask "*Æolus*," whether he has ever thought of the wear and tear of the continuous valve of the atmospheric system, hinged, as it is, by leather on to one side to the pipe, thrown up with some violence, on account of its weight, and opening on one side much wider than the other—in fact, on the hinged side, presenting a right line, and on the other, when open, the arc of a circle? Has he also ever thought of the wear and tear of the engine and air pump, if ever worked, as at Wormwood Scrubbs, above the speed for which they were constructed? Has he gone into the comparative cost of the two systems, or their comparative forces? Again, can he, for a moment, imagine that I should require "pipe and groove men" stationed every half mile along the line?—(See *Railway Times* of January the 13th this year—article, "Blackwall and Greenwich Lines." I will not ask him for what purpose it is proposed so to station these "pipe and groove men" on the atmospheric system, but I call upon him, as a candid writer, only desirous to bring the truth to light (and I have no reason whatever to believe him otherwise), to admit that the heavy annual expense here announced could never attach to the hydraulic system—my continuous valve will be held closed by an hydraulic pressure of about 90 lbs. on the square inch. "*Æolus*" has very properly come forward to offer the public the benefit of his opinion on the two competing systems, and I flatter myself he will now allow that same public to avail itself of the advantage of his further observations. I hope it will generally be considered that I have taken a middle and correct course in the tone and observations in this letter—*comparative*, with reference to the two systems, it unavoidably is, from the nature of the communication that has called it forth.

*Bath, Jan. 30.* J. G. SHUTTLEWORTH.

P.S.—In your Notices to Correspondents, in your impression of Jan. 27th, you mention hydraulic experiments, connected with the hydraulic railway, as being likely to be made soon at Bath. As being resident in the neighbourhood, you will, perhaps, Mr. Editor, allow me to say, that I have not heard of anything of the kind. It is true that certain hydraulic experiments, on a rather extensive scale, and to be conducted with great care, are about to take place here, but it has never to my knowledge been intimated, in the slightest manner, nor have I reason to suppose, that they have any reference to my invention—in one word, these experiments, I believe, will be instituted to determine with accuracy the power of water in piping to throw up pretty strong jets of the fluid, to rather considerable altitudes under high pressures, and then descending to those which are lower.

## RAILWAY REFORM.—LETTER IV.

SIR,—If I am not much mistaken, the 5th of February, 1844, will mark the commencement of a new era in the railway system of this country. It was on the evening of that day that the first practical proof was given that the discontent and agitation which has prevailed in this country for some time back, by reason of the abuses in our present system, were duly appreciated in the proper quarter, and that the President of the Board of Trade moved in the House of Commons for a committee of inquiry to consider to what extent our present railway system may be improved, more especially with the view to render travelling for the poor and working classes more commodious than what it is at present. It may be said, that the labours of the committee for a somewhat similar object in 1839 were without much practical benefit, and, therefore, but little good can be expected from the inquiry and reports of the one now about to be appointed. But the circumstances of the two cases are widely different. A strong feeling exists in the minds of many at the present time, that it is not a partial modification, but a total change of system, that is absolutely necessary to render available to the people of this country the full advantages to be derived from these great arteries of internal communication. Opinions are now discussed which heretofore were never even breathed, and projects boldly advocated, both in public and by a large portion of the influential press, which twelve months since were not dreamt of. Nor is this all: the last five years have brought with them numberless scientific discoveries and practical improvements in the construction and management of railways—improvements from which the public have derived no advantage whatever, either by a decrease in fares, or increased accommodation. It is time, therefore, that something should be done, and most assuredly her Majesty's government have lost no time in bringing this most important subject under the notice of the legislature. A more fitting opportunity than the present could not have been chosen. Notice has been given for the introduction of no less than sixty six new bills, either for the construction of new or the amalgamation of old lines; and not only is it proposed by companies to extend our railways nearly 1000 miles, but also, by carrying out the principle of consolidating property, to give the directors a power hitherto unheard of in this country, and deprive the public of the little advantage they might expect to gain by the continuance of a few competing lines. What are the specific objects of inquiry to which the attention of the committee of the House of Commons is to be directed? They are two. The first may be stated in a few words, which appear something like a parody on an old song—"What shall they do with the old companies before they begin with the new?" 2d. Under what conditions shall the companies that are now being formed, and those that propose amalgamation, obtain their respective bills? It is to be observed, that it forms no part of the duty of the committee to inquire into the expediency or necessity of an organic change in our railway system—that no allusion whatever is made to the principles of railway reform, as that term is now generally understood—viz. the purchase or construction of railways by the state, a consolidation of property under one general management, a low and uniform tariff, and the abolition of third-class trucks or wagons. But when an inquiry into the railway system is once commenced, who can say where it will stop? If the committee which is now formed should report to the House of Commons, "that so long as the present system is continued, and railway property remains in the hands of private parties, it is impossible for the legislature effectually to interfere, without establishing a principle utterly destructive of all commercial enterprise—viz. the right of the legislature to violate its own contract, and interfere in the management of private property." If such evidence should be laid before the committee, as to induce it to make such a report, is there any reason to doubt that the House of Commons, which has already acknowledged the necessity of railway reform, would refuse to invest the committee with power to inquire into our entire system. As far as relates to existing companies, the committee can do little more than consider, "1. What extent of change in the several companies' charges and mode of management would be desirable for the public good? 2. On what terms would the companies consent to carry those changes into effect?" Before proceeding to consider what evidence may be submitted to the committee on these two points, it is desirable to draw a clear distinction between the two different causes of complaint against our railway system—viz. high charges, and improper treatment of passengers. The first originates in the system itself, and cannot be fairly charged against the companies. In most cases, their bargain with the state permitted them to make what charges they pleased, although in some cases they were limited to 3d. or 3½d. per mile for each passenger. Even those companies whose tariff may be said to have a limit, convey passengers at little more than a third of what the law permits them to demand. The Great Western, for instance, whose system of management, as regards the public, has subjected them to more obloquy than, perhaps, any other company, charge for their third-class passengers from London to Bristol 12s. 6d., although they might, if they thought proper, refuse to take less than 25s.; and although these profits might be nearly as much if they only charged 1s. 6d. instead of 12s. 6d., on the same principle that any other body of traders might gain as much by charging five instead of fifty per cent. profit on their wares, still that is a matter entirely for their own consideration, and must be regulated by what they conceive to be their own interests. The second cause of complaint, the bad treatment which second and third-class passengers are subjected to, comes more home to the companies. Nevertheless, they are not without a ready reply to the charges made against them in that respect. Take the same company, the Great Western, for instance, what do they say? "From the time we commenced carrying third-class passengers till the present time, we have made no increase in our fares, or varied our mode of treatment to any class of passengers; if we had done so, there might be some cause of complaint, but in the present case there is none. We treated third-class passengers when there were coaches running in opposition to us, if any thing, worse than what we do now; and it is evident, therefore, from the very fact of the coaches being discontinued, that the public—the poorer portion of it—preferred our third-class trains to the coaches; and as the road is as free to coaches now as it was formerly, if there is such cause of complaint, why do not their proprietors put them on the road again?" The London and Birmingham Company might make a still stronger case. There is still on the northern line a coach between London and Birmingham, at the old fare, charging 2s. less than by the third-class train, so that, literally speaking, the public travelling northward is *not* obliged to have recourse to this railway. The case, then is simply this—the state has made a very foolish bargain with the several companies; but, bad as it is, or were it seven times worse, it must be adhered to, unless it annihilates the bargain by purchasing the property. That step does not seem at present to be contemplated, any modifications, therefore, of the original bargain which might be deemed desirable, must be made by *mutual consent*. The debate which will shortly ensue in the French Chambers, on the system of the 11th June, will exercise no little influence on the people of this country. In France the question is thoroughly understood, so far, at least, as the power of steam is concerned, and the intrinsic low cost of travelling on railways. It would seem that it is the intention of the French government to carry out the law of the 11th June; there is little doubt but that such a project will meet with considerable opposition in passing through the Chambers, and if eventually carried, will, no doubt, be very much modified. The main point is the adoption of a low tariff, regulating the fares by the cost of traction. If such should be the case—if the French would try the effect of low fares on two or three of their lines—it is not themselves alone, but the whole of Europe and America that would derive the benefit from such a great experiment. It is not to be expected, that any company would make such an experiment at their own risk. Really, we have done so much for the French—or, rather, they will gain so much by us in the way of warning, from knowing the effects of our *laissez faire* system, that they ought to feel themselves bound in all courtesy, were it on our account alone, to make such an experiment!

The *Moniteur Industriel* has inserted my last letter to you on the subject of the French system, and the Editor has added some remarks of his own, conceived in a very liberal spirit. It would show bad taste on my part to carry the discussion further; it is always a delicate matter interfering in what does not immediately concern us, and the French are perfectly able to settle their own affairs, without attending to anything which might seem like a suggestion from this side of the channel. If the law of June be carried into full effect, no doubt all parties will concur in rendering it as perfect as possible, though I cannot help regarding it as a national misfortune for France; but, at the same time, the system of the law of June, with all its imperfections, is infinitely superior to ours.

*Feb. 8.* THE AUTHOR OF "RAILWAY REFORM."

## THE HINCKLEY BANK PROCEEDINGS—HEMING v. LAW.

SIR,—Several public journals have alluded to the motion for a new trial in this cause, and my affidavit, which was read in court, having been omitted, I shall be obliged by your inserting it in your next publication; and as the affidavit of William Ivison appeared to make a great impression on the court, I beg to give you an extract from Dempster Heming's affidavit, read in the Insolvent Court, in the cause of Benbow v. Chard, alias Henry Leigh Alleyne, and also the affidavit of the said William Ivison.

In the affidavit read in court on this motion, amongst other extraordinary things, he states that, "on the 9th of September, 1840, I was a debtor to the firm of Heming, Needham, and Co. 5538l. 6d., or thereabouts, and that at the time of the commencement of this action, I was justly and truly indebted to the Leicester and Warwickshire Banking Company 6909l. 16s." My affidavit proves how far the first statement of account may be relied upon, and the latter is fully answered, not only by the said Ivison's affidavit, but by the copy of my alleged account, which account was sent by Mr. Fearshead, solicitor to the Leicester and Warwickshire Banking Company, to my solicitor, Mr. Payne, of Nottingham, in August 1842, several months after the *close of the bank*. The trial of Heming and his Wife v. Power, at the Leicester Spring Assizes, in 1842, brought many wonderful mysteries to light, and as parties who figured in that memorable trial are supposed to be the directors of the proceedings in this cause, and as matters are now pending in Chancery on the Hinckley Bank affairs, I trust the public will suspend their judgment on my case; and I pledge myself to prove that a wicked persecution has existed against me, and that Mr. Dempster Heming is now justly and truly indebted to me more than 15,000l. J. S. NEEDHAM.

[The account referred to as having been sent from Mr. Fearshead to Mr. Power, is from Oct. 12, 1840, to March 31, 1842, on which date he is debited with 2000l. for bad debts, as paid the Hinckley Bank private account, while the balance to his favour was only 1701l. 9s. 9d., thus leaving him indebted (including an error on 12th Aug. 1840, of 68l.) to the amount of 1013l. 17s. 3d.

EXTRACT FROM HEMING'S AFFIDAVIT.

(Read in the Insolvent Court in the case of Benbow v. Chard, alias H. L. Alleyne, in November, 1842.)

And, lastly, this deponent saith that the said William Ivison was selected by the said Henry Leigh Alleyne, and employed by him on behalf of this deponent, to make a balance-sheet of the affairs of the said co-partnership business of this deponent and the said Joseph Smith Needham, at a salary of 4l. per week, which was afterwards increased to the sum of 7l. 10s. per week for himself and his son, and that the said William Ivison began his investigation of the said accounts in the month of February, 1841, and continued in such employ until the month of February, 1842, and that although the said William Ivison previously to the said month of February last, received the sum of 300l. 0s. 6d. or thereabouts, for his alleged services, he has never yet rendered to this deponent a balance-sheet of the said co-partnership concern. That the said William Ivison, although he had thus been paid the sum before-mentioned, made a further demand of 119l. 14s. 6d., or thereabouts, for his alleged services as such accountant, and brought the action against this deponent to recover the same, in which said action this deponent caused to be paid into court a further sum of 19l. 1s. 6d., and which action was tried in the month of June last, at Warwick, and although this deponent called no witnesses, the jury found a verdict for this deponent, and this deponent further saith that he believes the said William Ivison has been actuated by malice, in causing this application to be made to this honourable court, because this deponent would not comply with the said unjust demand of the said William Ivison, for which he sued this deponent, as last mentioned, and this deponent submits to this honourable court that the said William Ivison has committed a breach of trust and confidence as an accountant, in revealing to the said Richard Benbow and others the contents of the books of accounts of the said bank and trades in which this deponent was engaged as herein before mentioned.

IVISON'S AFFIDAVIT—IN THE EXCHEQUER OF PLEAS.

(Dated March 17, 1843.)

NEEDHAM v. LAW.—William Ivison, of Seward-street, Bishopsgate-street, county of Middlesex, accountant, maketh oath, and saith that he, this deponent, was employed by the said banking company, and not by or on behalf of the plaintiff, to examine and assist in making up the books and accounts of the said company, previous to its being brought to a close. That he accordingly did examine the books and accounts of the said company, and, in consequence, of such examination is well acquainted with the state of the account between the said plaintiff and the said banking company. That for the purpose of certain proceedings in Chancery instituted by the defendants, he, this deponent, [illegible] the plaintiff's said accounts with the said banking company, with a Mr. Edward Ross Jervis, the attorney for the defendants in this action, and the result of such investigation was that the said Mr. Jervis, as well as this deponent, [illegible], that the account, as stated in the books of the said banking company, was correct, and by which account a very large balance appeared to be due to said plaintiff. That such examination and investigation took place nearly twelve months after the plaintiff ceased to be manager of the said company, or to have any connection with the books or accounts of the said company, and that at the time of such examination and investigation, the books of the said company were in the care and custody of the then public officers of the said company, and were still in their care and custody after such examination and investigation as aforesaid; and this deponent very believes, that the said books and accounts have since been, and now are, in the custody, or under the control of, Mr. Ferguson, the defendant's agent in this action. And this deponent further saith, that he verily believes the said plaintiff had not, in any manner, interfered with, or had any power with control over, or access to the said books and accounts, or any or either of them, since he so ceased to be manager of the said banking company as aforesaid. And this deponent lastly saith, that all the accounts between the said plaintiff and the said banking company might be fully and fairly investigated and understood in a few hours.

In Mr. Needham's affidavit, read in this cause, and upon which the rule nisi was obtained, which, from its legal technicalities, would be uninteresting to our readers if given entire, he states that on the 10th of October, 1840, he deposited 2000*l.* with the Ashby branch of the Leicestershire and Warwickshire Banking Company, which sum he had drawn out of the Hinckley Bank—Messrs. Heming, Needham, and Co., and that in his particulars of demand in this action he sought to recover 1566*l.* 16*s.*, the balance on the said 2000*l.*, as shown by the pass-book of the company. That about the 21st January, 1841, he also deposited with the Leicestershire and Warwickshire Banking Company 2000*l.*, and that he sought to recover in like manner 2196*l.*, balance on the same. That he was advised by counsel to reduce this claim on the two balances to 1790*l.*, as the banking company had debited him with 1600*l.* for the purchase of Wildey's bank at Atherstone, and 800*l.* for a balance alleged to be due, but which he was advised he could recover by another action. That the sum of 1790*l.* is due to him, as appears from the pass-book, although containing the two last mentioned sums to his debit. That in October, 1840, the credit balances due Heming and Needham were transferred to the Leicester and Warwick Banking Company, and a list of such balances were prepared by one Frederick Danny and one Frederick Needham, and that such list is in the same state as when he first received it from the bank. That in such list appears a balance of 51*l.* 10*s.* 6½*d.* to his credit, afterwards increased to 1051*l.* 10*s.* 6½*d.*, from 1000*l.* being added on account of a division of a balance in favour of the bank of Heming, Needham, and Co. That the balance, according to Danny's statement, amounted to 3000*l.*, but believing it was overrated, and wishing to have sufficient in hand to answer all claims, agreed with the other partners to divide 2000*l.* of the said 3000*l.*, and this was effected, Mr. Needham's share being the 1000*l.* above mentioned, which division was made upon the faith of a written guarantee by Mr. Hall, a partner in the bank. That P. Fouracre (solicitor of the Leicester and Warwick Bank) sent an account to Mr. Payne, in which the 1051*l.* 10*s.* 6½*d.* is duly credited. That by an agreement with Heming, about Jan. 1, 1841, 2000*l.* was to be placed to the credit of deponent's account with the Leicester and Warwick Bank, in consideration of which he agreed to retire from the management of the firm, since which time he has had no control whatever over the bank, or their books or documents. That said books have since been materially altered, and deponent has been informed by one Wm. Ivison, and believes it to be true, that Henry Chard, alias Henry Leigh Alleyne, then one of the directors of the Leicester and Warwick Bank, wrote to said Ivison, who was then accountant of the bank, the following letter:—"Dear Sir,—In reference to the above plan, restore the original true entry, and take the 2000*l.* off Mr. Heming's account, and credit me, who really advanced the money. I am glad to hear you are drawing to a conclusion.—(Signed) H. L. Alleyne." That on the trial of this cause, the books were produced on behalf of deponent, upon which a successful defence was made with reference to the alteration (alleged to be forged) of 51*l.* 10*s.* 6½*d.* to 1051*l.* 10*s.* 6½*d.*, arising as before stated; and another charge of fraud was made on account of the alteration of the 2000*l.* in the books of the Ashby branch, and which sum of 2000*l.* was the deposit made on October 10, as aforesaid. That he was entirely taken by surprise at the charge of fraud set up, well knowing no fraud existed, and that he could easily have refuted such charges by the evidence of his late partner, Mr. J. Hall, and others. That he was entirely ignorant of the alteration of the 2000*l.*, and had he known of such intended charge, he could have successfully rebutted it by the most satisfactory evidence. That he was further taken by surprise at the evidence of William Ivison, in opposition to his above inserted affidavit; and that defendant filed a bill in Chancery for an injunction to restrain the deponent from proceeding with this action, and obtained it, which was dissolved by Vice-Chancellor Wigram, such being confirmed by the Lord Chancellor.]

## VENTILATION OF COAL MINES.

Sir,—In the *Mining Journal* of last week, one of your ablest correspondents, in describing Mr. Hyne's mode of ventilating coal mines, expresses himself somewhat metaphorically—thus, "bleeding the coal where the pitthore is found most to prevail, which is done by a gas drift parallel with the faults, and at right angles with the fissures from whence the gas is discharged." Now, Sir, it has so happened, that, for some years, I have occasionally set my foot within the precincts of an extensive colliery, which is crossed by a large upthrow fault from north to south, the seams of coal, &c., dipping west towards the fault, on the east side of which one of the principal veins of blast-furnace coal has been worked for fifty years, without the least obstruction from what the colliers term fire damp; on the west side of the said fault, from which the mineral beds dip, the same vein of coal has been worked for a much shorter period, but at all times found highly charged with carburetted hydrogen gas—so much so, that, without a good systematic mode of ventilation, would add to the list of those dread calamities too often occasioned by explosion. Perhaps, your correspondent alluded to, will explain why the gas appears on one side the fault, and not the other; the strata has every appearance of retaining its solidity near the fault, as in other parts of the coal mine. Whatever substance has been set in motion at the time of the dislocation, it has not decayed by time, but as faults are not at all times seen, either to pen up the gas or to facilitate its escape, I am somewhat curious to ascertain at what distance from the faults, and also from each other, the gas drifts would be available, as it is evident, from such reasoning, that the fault must discharge the gas from one side, or confine it to the other—or, in other words, cuts off the locale which generates it in one side and not the other.

*Abergavenny, Jan. 30.* A South Wales Collier.

## GRAVESEND, ROCHESTER, AND CHATHAM RAILWAY.

Sir,—Allow me to caution your readers well to consider the prospects of this line before they embark their money in the purchase of shares. In the first place, the projectors, in their prospectus, inform the public that the whole works, cost of land, and every outlay of forming the line, except the Parliamentary expenses, can be effected for 115,000*l.*—a sum so inadequate, when the nature of the works are examined, as to convince any person, who has any knowledge of the subject, that, if ever the line is completed, as much more will be required to be called for. Eleven miles of railway, crossing so many public roads, and having a tunnel three quarters of a mile in length, with difficulties arising from the determined opposition of the landholders through which it is to pass, will never be completed for less than double the quoted amount, even if they obtain the Act, which is very doubtful; and, in the second place, the projectors have the temerity to estimate a return of 11½ per cent.—while they propose a line of railway which studiously avoids the population it is professed to benefit—not touching either Gravesend, Rochester, or Strood, and depending almost solely on the traffic between the London steam boats and Chatham. I think it will be necessary to convince the public of a chance of better returns than this can ever insure, before subscribing to such a line; and I think I am only doing a public duty—having had the subject pointed out to me—in stating these objections, that they may, if they can be, refuted.—*Gravesend, Feb. 1.* A Cautious Speculator.

## LONDON AND GREENWICH RAILWAY.

Sir,—May I request insertion of the enclosed protest, which I have sent to Mr. Alexander, secretary of the London and Greenwich Railway Company, requesting him to lay the same before the board of directors; and allow me to remark, in reference to what took place at the meeting on the 30th ult., that the [illegible] show of hands which the directors obtained, after I proved that the report of August last had not been adopted, cannot [illegible], much less legalise, the entry alluded to in the enclosed protest. It is not the sum alone, but the principle itself is bad, which recognises the right of one man to give away the property of another.

*Threadneedle street, Feb. 2.* R. S. [illegible]

To the Chairman, Deputy Chairman, and others, the Directors of the Greenwich Railway, and to the Law Officers of that Company, and to all others whom it may concern.

I, Robert [illegible], of the Stock Exchange, and [illegible], Threadneedle-street, do hereby solemnly, legally, and constitutionally protest against the following [illegible] entry in the profit and loss account of the London and Greenwich Railway, presented to the shareholders at the meeting on Tuesday last, the 30th ultimo, namely—

"[illegible] Brighton Railway, as per agreement, 1790*l.* 1*s.* 3*d.*"

[illegible]

## INSTITUTION OF CIVIL ENGINEERS.

Feb. 6.—The President in the chair.

The first paper read was by Mr. S. B. Moody; it described a water-wheel, constructed by Mr. W. Fairbairn, from the designs of Mr. B. Albano, and erected at the Flax-mills in Lombardy. The chief peculiarities of this wheel consisted in the introduction of the tension principle for the arms, and the ventilation principle for the buckets. The use of wrought-iron bars, as arms and braces, on the tension principle, diminished the weight, as fewer centres and arms were required; and, consequently, a lighter shaft could also be employed. Repairs were less frequent, and also were not so expensive as with cast-iron arms. In the old form of the buckets, the air, entering with the water, prevented them from filling, but, by the introduction of an inner sheathing, forming a space between it and the sole plate, the air was permitted to pass off freely; and the buckets, being thus ventilated, were enabled to be more completely filled, and the effective power of the wheel was increased. Mr. Albano explained its construction, and stated that its speed was about six feet per second, and that the useful effect obtained was equal to [illegible]ths of the power expended, which was higher than many of the best wheels had attained. He then described a very ingenious adaptation of the balance-weight governor for the penstock, for regulating the flow of the water to the wheel.

A "Description of a Water Meter," by Mr. P. Carmichael, was then read. The mode of operation of this meter, which was attached to the feed-pumps of three steam-boilers, supplying an 80-horse engine, was thus described:—As the water proceeds through the discharge valve the float sinks, until it comes in contact with a detent, or catch, attached to a rod, which is suspended from a lever; this moves round a spanner and pendulum, until it passes the centre of gravity, when the pendulum falls and strikes a spanner, which shuts the discharge valve and opens the inlet valve from the reservoir to the closed box which supplies the boiler. A dial, the hand of which was acted upon by the spanner, indicated the number of times of the emptying of the reservoir; and it was stated that the action of the machine was very correct.

Dr. Roth's Automaton Calculator was exhibited, and its action explained by Mr. Wertheimber. He gave a short review of the various attempts at constructing calculating machines—noticing the Roman abacus—the calculating bones of the Chinese and the Russians. The several classes of instruments invented by Napier, in 1617; by Perrault and others, in 1720; and subsequently the slide rule, invented by Michael Scheffelt, of Ulm, in 1699; the more important machines attempted by Pascal, in 1640; by Moreland, in 1673; by Gersten and Leibnitz, which were submitted to the Royal Society of London and the Academie de Science in Paris; he then mentioned the machine of Mr. Babbage, upon which upwards of 20,000*l.* had been expended before the project was abandoned; and the finished part, which formed tables of progression up to five figures, was consigned to the Museum of King's College, London. Dr. Roth's machine appeared very simple, and its results, which were severely tested, were very accurate. It performed all the operations of arithmetic, from simple addition, subtraction, multiplication, and division of numbers, or of pounds, shillings, and pence, to vulgar and decimal fractions, involution and evolution, and arithmetical and geometrical progression, with surprising rapidity. It appeared particularly adapted for checking long calculations of quantities for contractors, for the merchants' counting-house, or for Government offices. The same principle had been adapted as counters for rotary, or reciprocating, machines, and they appeared, from the compactness of their forms and their regularity of action, to be well adapted for the purpose.

A collection of specimens were exhibited of a new material for architectural decoration. It was termed the "Cannabic Composition," and was stated to be composed of hemp, with a resinous mixture, which, after a careful preparation in sheets, was forced by powerful presses into metal moulds, producing very sharp ornaments, in high relief. The details of this mechanical arrangement was promised by Mr. B. Albano, C. E., on a future occasion. The ornaments were stated to be so hard, as to bear a blow of a hammer. They were very light and elastic, resisting the action of heat or cold and of water, without change of form. Mr. Ponsonby, agent, of the Regent-circus, Piccadilly, explained that the specimens were capable of being bronzed, gilt, or painted, so as to produce an excellent effect for ceilings and other internal decorations, and it was stated that the price was from ten to twenty per cent. below that of any other material in use for a similar purpose.

The monthly ballot for members took place, and the following gentlemen were elected:—Messrs. S. Robinson and J. Fowler as members. Messrs. R. Cowan, B. H. Blyth, T. Wilson, J. Houldsworth, A. J. Robertson, J. T. Blackburn, Æneas Coffey, J. G. C. Curtis, and G. Nasmyth, as associates.

The following papers were announced to be read at the meeting of Feb. 13:—"Results of experiments on a vessel called the 'Liverpool Screw,' fitted with Grantham's patent engine and screw propeller," by J. Grantham, Ass. Inst. C. E.—"Description of a bridge across the river Shannon, at Portumna," by T. Rhodes, M. Inst. C. E.—"Description of an hydraulic traversing frame, at the Bristol terminus of the Great Western Railway," by A. J. Dodson, Ass. Inst. C. E.

## THE NEW PATENT CANNABIC COMPOSITION FOR ARCHITECTURAL AND ORNAMENTAL DECORATIONS, &c.

At the Society of Arts, on Wednesday evening last, a paper was read by Mr. Whishaw, on the above composition. It is composed of hemp, chemically amalgamated with other substances, in which state it is formed into sheets of any thickness, and can then be moulded, giving out a boldness in relief, and a sharpness in the details which cannot be attained by any material in use. It is considerably under one half the weight of *papier maché*, and of so tough a nature, that a fall from any height will not cause the slightest injury. It takes gilding in a most superior manner, and is capable of being burnished up to the refulgence of solid metal. Some specimens of centres for ceilings, panel corners, running ornaments for cornices, friezes, &c., were laid on the table and hung round the walls, and excited considerable admiration. The general cost is about from 10 to 20 per cent. under materials now in use, but the patentee is completing besides a large collection of new designs. In the more difficult and elaborate works, such as highly ornamented centres, panels, &c., the cost is not one half of those formed of *papier maché*, while its extreme lightness, the facility with which they can be fixed, and its impermeability to damp, or even water, there is no doubt, when generally known, it will command an extensive application. So impervious is it to water, that it has been used on the continent for a covering for roofs, in which situation it has remained for months uninjured. It is the invention of an Italian gentleman, who having applied to the patentee to assist him in carrying out the mechanical improvements, the patentee was so struck with the elegance and value of the invention, that he considered the introduction of it into this country highly valuable. Mr. Thomas Ponsonby, house decorator, 32, Regent-circus, Piccadilly, is the sole agent, where are ready a very large assortment of patterns for inspection of very elegant and new designs.

Rapid Communication between London and Paris.—The opening throughout of the South-Eastern line has given great facilities to expeditious travelling between the two metropolitan cities of England and France, and when the system of continental railways is complete, a greater number of superior steamboats placed on the channel stations, and the difficulties and loss of time experienced on the continent by the annoyance of examining passports is modified, the distance between the two capitals will be got over in considerably less time. We give the following extract from the letter of a valued correspondent on his arrival in Paris the end of last week:—"I left London at half-past 1 p.m. by the Folkestone train, arriving at the latter place at half-past four; I dined at the hotel—mulligatawny, cold turkey, and ham, 1*s.*; ale, 6*d.*; servant, 3*d.*—in all, 1*s.* 9*d.*; a large comfortable coffee-room, everything clean, plenty of newspapers and periodicals, with excellent attendance, and the charging the moderate sum of 3*d.* in the bill for the latter, prevents much annoyance; at eight o'clock I embarked on board a steamer, reached the Folkestone Hotel, Boulogne, half an hour before midnight, and, including a good night's rest, arrived at Paris in twenty-four hours from the latter place, and thirty-two from London. I am very much pleased with the expedition and comparative comfort of this route, and when some superior boats are put on, which will, no doubt, be the case from the spirit of enterprise shown at present in the traffic, I am sure it will become popular."

## ON SALT DEPOSITS.

[Compiled from the writings of M. [illegible] "On Marine Salt," in the Transactions of the Geological Society of France.]

Nearly always the pure and solid masses of marine salt, which are here spoken of, and particularly those of Transylvania, Hungary, Poland, Siberia, and England, are found in small plains; the space which contains them is hemmed in by small eminences of the soil, so as to form a basin: many of these in Hungary will hardly suffer the water to escape. Very generally, between the layers of stones and salt, is a bank of gypsum; this gypsum is of different colours, being crystallized, striated, &c., and mixed with marine shells. The beds of salt are horizontal. They are found from four inches to four and five feet in thickness. Those of Hungary, Transylvania, and Poland, are generally between one and two feet thick: the layers of clay which separate them vary from two lines to three or four inches. The white and transparent salt only contains soda, muriatic acid, and water; the grey salt contains clay, sulphate of lime, muriate of magnesia, calcareous muriate, and muriate of soda. The situation of the salt plains, the heights which bound them, the successive beds of salt and clay, the diverse sea shells which are found in the clay, and in the layers of gypsum, appear to explain in part the formation of these masses of marine salt. The small eminences which surround the plains in which are the mines of pure salt in solid masses, prove that prior to the deposit of salt, these identical plains were merely holes or reservoirs, which were capable of containing the water which came thither, and so formed lakes of small or large extent; that of Wieliczka must have been considerable. The marine shells found in the clay and in the gypsum, prove, in the most indisputable manner, that the sea water has covered these places. Supposing, then, that the sea water has covered those spots where mines of pure salt in solid masses are discovered, and that the sea shores are still very distant, it is easy to conclude, that the sea, in retiring, did so under different circumstances as regarded each mine, at such a distance from them, and at such a difference of level, that its water could only arrive by very high tides, by some annual overflowing, or by some extraordinary tides at more distant intervals. The sea water arriving within reach of these large reservoirs, and only filling them at the time of extraordinary tides, these waters were exposed during the interval of each tide to the augmentation and diminution occasioned by rain and evaporation. As all experiments made to the present time on the quantity of water fallen and that evaporated, have uniformly proved, that if a vessel full of it is exposed to the action of the air, the quantity of water evaporated each year is greater than that which falls by rain, it must follow, that merely by the action of the air, the mass of water in these reservoirs must have diminished between each tide. The diminution caused by evaporation would so concentrate the waters of the reservoirs, and might bring them to that degree of saturation necessary for abandoning a portion of the salt held in solution. This then would precipitate, and would collect at the bottom of the lake or reservoir, and so form a bed more or less thick, till another tide would come to fill up again the reservoir with sea water. The water brought there being mixed with clay and other earth, would leave them as a deposit on its arrival; this deposit, which would be on the layer of salt, would cover it with a bed of clay, and so separate that layer of salt already deposited beneath and that which would be now formed. Thus every high tide occasioned the formation and separation of a new layer of salt; so that knowing the number of beds of salt contained in a mine in any of these plains, it would be easy to determine the number of tides to which they owe their existence. In considering the thickness of the layers or beds of salt of these considerable masses—in comparing them with the quantity of water that the reservoirs ought to have contained when they were deposited, and the surface which was in contact with the air—by comparing this thickness of the beds, the volume of water, and the surface, with the quantity of salt—the volumes of water and the surface of water in these salt marshes, we are led to conclude that the tides which brought the water, carrying these salt deposits, must have been very distant one from another. These layers of salt have so heaped themselves up in each mine, till the sea water could not enter into these reservoirs at the highest of tides; at this period, what remained of the salt water deposited its salt, and the rest of the reservoir must have been filled up by the earths or stony substances detached from the mountains, or driven there by the fluvial floods.

New Machine for the Crushing and Grinding of Grain.—This machine is composed of three cast-iron cylinders, two of which are placed parallel on the same horizontal plane, and turn in a contrary direction, so as to act like a roller. The external surface of these cylinders is formed of many circular cast-iron staves, connected and fastened by pins; their surface is full of angular grooves throughout the length. The cylinders are mounted on wrought-iron axes, and communicate the rotatory motion one to another by two vertical wheels of the same diameter. The axis of one of these cylinders extends beyond the machine to carry a fly-wheel, armed with a handle, by which means two men can work the apparatus. The upper cylinder is grooved in its circumference, and receives its motion from a vertical wheel mounted on its axis, and governed by a pinion. The material to be crushed or ground being thrown into a funnel, fall at first on the upper cylinder, and, flung round by its rotation, they tend to escape through the little space left between its circumference and the lower edge of the funnel, from which they are thrown in small portions through the two compressing cylinders. One of the inclined planes of the funnel is moveable, so as to regulate at will the separation as respects the alimentary cylinder. The substances reduced by the action of the cylinders, fall upon an inclined plane placed beneath, and which conducts them out of the machine.—*From a Correspondent.*

Earthquakes in South America.—Amongst the *Transactions of the Geological Society of France* we find the following communication from M. Chevalier:—"In the notice which I read to the society at its last sitting, I endeavoured to prove, not that the coast of Chili had not been raised considerably from the recent earthquakes, but that the reasons on which those relied who came to such conclusions, had not all the validity which had been assumed. I now think it advisable to inform the society of a fact, which, in my opinion, seems to prove in a satisfactory manner that the effects of these earthquakes have been very much exaggerated. Many celebrated authors have said that the island of San Lorenzo, of the bay of Callao de Lima, has been separated from the American continent from the earthquake of 1746. This assertion is repeated in most of the works which treat of Peru, and has not up to the present moment been contested. On examining the spot, I was surprised to find no analogy in formation between the mountainous isle of San Lorenzo, which belongs to a transitory soil, and the low plain of Callao, formed of alluvial beds; and from that time I thought there was some error, and that, perhaps, the irruption of which they spoke, had only tended to separate the two islands of San Lorenzo and Bodegon, which are much nearer, and which, at a date, more or less distant, had no doubt formed part of the same territory. On my return to France, I wished to try if my opinion was well founded, and found amongst the naval charts and plans of the Marine department a manuscript plan of the bay of Callao, designed by M. de Frezier, in 1711, in which the various places are represented precisely as they are in the present day. Not only is the isle of San Lorenzo separated from the continent by a considerable canal, but is situated the same as at present in relation to the isle of Bodegon, the summits of which are the continuation of that, and the geological appearance the same. If such a fact, therefore, is maintained, its date must be traced back to a period before the 18th century. The authors who have concluded that the southern coast of America has been raised considerably by the earthquakes subsequent to 1746, have not, in my opinion, explained in a precise manner what has been the limit northward of the effects of this elevation. Some of them state a fact which would go to establish that their effects were not felt at Lima; but they do not draw from it that important conclusion. This fact is, that the ruins of old Callao, destroyed by a flood which broke over the coast in 1746, are at present submerged. This may be explained by an effect of the elevation of the moveable strata of the plain of Callao, but, at the same time, that excludes all idea of any rising subsequent to 1746."

Use of Geology.—By mere accident he learned from Mr. P. W., residing at Tenby, the neglected state of a large tract of ground belonging to that gentleman in the south-west of Ireland, on which there had never been a plough; and, after in vain suggesting attempts at agricultural improvements, as well worthy of his attention, and likely to gratify as well as benefit him, he finally inquired if any subterraneous treasures had ever been suspected on the estate. He was cautiously answered, that, at some unknown time previous, metallic ore had been found, but that nothing of value was now expected. Mr. Smith [illegible] the [illegible] of this neglected property to lead to a matter of so much importance. The ultimate result was, the establishment of the now famous and very profitable [illegible] Copper Mine.—*Memoirs of William Smith the Geologist.*